

themum. Although very short, the suspensor, in these plants, bends in a remarkable manner in the middle, and is most frequently attached to the embryo-sac, beside the point touched externally by the twisted extremity of the pollen-tube.

XXXI.—*On the Tracheal System of Insects*. By THOS. WILLIAMS, M.D. Lond., F.L.S., Physician to the Swansea Infirmary.

To the Editors of the Annals of Natural History.

GENTLEMEN,

MAY I request that you will allow me the favour to announce in your Journal the results of a series of minute dissections which I have recently performed on the *Tracheal System of Insects and Myriapods*. In consequence of a letter on this subject from the late Mr. Newport, published in the 'Annals' of last year, calling in question the accuracy of my statements, I have ever since felt anxious to repeat the observations upon which those statements were made. That I have now done, and with the utmost care. I find, that not only are the results then stated true in every particular, but that they fall far short of indicating the real distinction between the "membranous capillary tracheæ," and those larger trunks in which the "spiral" is visible. My recent studies enable me now to state—

1. That the "spiralled" or larger tracheæ are mere conduits, like arteries or veins, and have nothing to do with, take no part in, the ultimate act of respiration.

2. That this function (that is, the interchange of the gases concerned in the respiratory act) has its seat exclusively in the capillary membranous tracheæ.

3. That the peripheric or extreme distribution of the tracheal system is conformable in plan to that of a blood-vascular system; that is, the capillary or membranous tracheæ are always placed intermediately between larger trunks, the branches of which they serve to connect,—standing to the larger trunks in the same relation as the capillaries of a blood-vascular system do to arteries and veins.

4. That the tracheæ can be discovered, in no single instance, to end in cæcal terminations,—always in mutual inosculations.

5. That this anastomotic arrangement establishes a close similarity between the tracheal system of Insects, Myriapods, and the blood-vascular system of the Annulosa,—a homology first theoretically suggested by Mr. Huxley.

6. That the tracheal system, however, is distinguished from the blood system in two striking anatomical particulars: in the

former, the main trunks affect a bilateral position, those of the latter are dorso-abdominal; that, with one doubtful exception, the blood system is closed, while the tracheal system always (that of a few aquatic larvæ excepted) communicates by means of spiracles with the external atmosphere.

7. That the tracheal and blood systems of Insects come into conjunction *only* at the peripheric segments,—the main trunks of each observing separate courses.

8. That the periphery of the circulating fluid system of Insects is constructed in exact conformity with the Crustacean model, the blood flowing in *imparietal* channels, in and through which the capillary tracheæ are conducted, floating in the nutritive fluid.

I remain, Gentlemen,
Your obedient Servant,
THOMAS WILLIAMS, M.D.

BIBLIOGRAPHICAL NOTICES.

Insecta Maderensia; being an Account of the Insects of the Islands of the Madeiran Group. By T. VERNON WOLLASTON, M.A., F.L.S. London: 4to, pp. 634, plates 13.

SOME persons are singularly qualified for producing a work on the natural history of a country. To give one instance:—Otho Fabricius, a Danish clergyman, spent some years of his life in Greenland, and thus acquired an intimate knowledge of that Arctic land, which modern discovery begins to show must be an immense archipelago bound by one great band of ice. When he left Denmark, with but little knowledge of natural science, but ardently desirous of studying the works of Him, whose word "*ut Missionarius ordinatus, ab honoratissimo Collegio de cursu Evangelii promovendo,*" it was his calling to proclaim, Fabricius took with him, in 1768, that natural-history cyclopædia of the time, the '*Systema Naturæ*' of Linnæus, and, urged by those who ordained him, to study Arctic natural history at his leisure hours, he returned in six years with great materials for a Physical, Geographical and Historical History of Greenland. In May 1779 he wrote the preface of a portion of this work, the '*Fauna Grœnlandica,*' which was accordingly published next year, and the character of which may be best given in the words of Cuvier: "*Ouvrage précieux par l'extrême exactitude des descriptions.*" It is the work of a diligent, observing man, limited by climate to a highly interesting, but comparatively narrow, field. He has but few books to distract him, and but few bibliographical researches to make.

Mr. Wollaston, though he went to a tropical climate, was singularly happy in having such an atmosphere as envelopes an ocean-girt island of limited size, 250 miles distant from a continent